REMARKS/ARGUMENT

Claims 1, 2, and 4-9 have been amended to clarify the subject matter contained therein including removing means-plus-function language and thereby broadening the claims.

A. 35 U.S.C. §103 CLAIM REJECTIONS:

Under 35 U.S.C. §103, to establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation in the reference itself or knowledge generally available to one of ordinary skill in the art to modify a reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, a prior art reference, or references, when combined, must teach or suggest all of the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must be found in the prior art not based on the applicant's disclosure.

The Examiner has rejected Claims 1-9 under 35 U.S.C. §103(a) as being unpatentable over Umemoto (U.S. Patent No. 5,636,323), in view of Satoh (U.S. Patent No. 5,146,507). The applicant has amended Claims 1, 2 and 4-9 to clarify the applicant's invention therein and respectfully submits that Claims 1-9 are in allowable form.

The present invention teaches a loudspeaker unit that controls three acoustic parameters, namely a frequency characteristic and an echo characteristic or a reverberation characteristic, so that the loudspeaker unit can easily replicate a given acoustic characteristic in different environments. The loudspeaker unit reproduces the same frequency characteristic, echo characteristic and reverberation characteristic while being deployed at different environments.. The loudspeaker unit amplifies a production sound signal that originates from a "radio tuner, a compact disc [player], or a sound chip of a personal computer" (Specification, p. 6). The processor corrects the sound signal to the frequency characteristic and the echo or reverberation characteristics by using the difference in output signal between the sound source and an output signal from a microphone that picks up the sound from the loudspeaker. In this way, the applicant's invention improves over prior art loudspeaker units that used a reference signal to adjust only the frequency characteristic before playing the production sound through the units.

Umemoto was cited in the Office Action as teaching a microphone, echo canceler that "reads on a processor means for comparison", a speech amplifier, and a loudspeaker (see Office Action, p.2). Satoh was cited as teaching a processor means relevant to frequency characteristics.

The Applicant's invention, however, does not cancel out echo but rather seeks to adapt a loudspeaker to a given environment by controlling the echo characteristic or reverberation characteristic of the loudspeaker so as to reproduce a given reference acoustic environment (see claim 1). The echo may indeed be reduced but may in fact need to be increased to reproduce the echo in a particular acoustic environment, and some echo is often desirable in a given acoustic environment. An echo canceler such as that disclosed in Umemoto thus performs a different function than the Applicant's claimed invention.

Umemoto fails to disclose or teach other portions of the present invention cited in the Office Action. Umemoto teaches a microphone for picking up a person speaking, describing "[a] speaker's transmitting speech signal input to a microphone..." (column 4, lines 30-31) rather than teaching "a microphone for picking up a sound regenerated from a loud speaker" (Claim 1, present invention). Umemoto further fails to teach a processing means that compares an output signal from a microphone with an output signal from a sound source "and correcting a signal from the sound source based on the difference in output signal between the microphone and the sound source" (emphasis added) as taught in claim 1 of the present invention. The Umemoto reference, rather, teaches canceling an acoustic echo contained in the speech signal, i.e. the sound recorded by the microphone (see Umemoto, Fig. 2).

Finally, nowhere is it taught in Umemoto to correct a signal from the sound source using the "difference in output signal between the microphone and the sound source " (claim 1). Umemoto instead teaches correcting the signal from the microphone rather than the sound source. The applicant thus submits that Umemoto does not teach the portions of the applicant's invention as cited in the Office Action, and consequently, that the combination of Umemoto and Satoh fails to teach the applicant's present invention.

With respect to the other claims, Claims 2-9 depend from independent Claim 1 either directly or indirectly, and include all the limitations found therein. These claims recite additional limitations which in combination with the limitations of Claim 1 are neither disclosed nor suggested in Umemoto or Satoh or the combination thereof. Accordingly, these claims are also believed to be in allowable form.

CONCLUSION

For the foregoing reasons, the Applicant submits that claims 1-9 are in condition for allowance, which action is respectfully requested. The Examiner is invited to please contact the undersigned to resolve any remaining issues.

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, D.C. 20231, on March 2, 2001

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Respectfully submitted,

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APPENDIX B

VERSION WITH MARKINGS TO SHOW CHANGES MADE

37 C.F.R. § 1.121(b)(iii) AND (c)(ii)

CLAIMS:

1. A loudspeaker unit [adapted to environment] for a sound source, the loudspeaker unit being adaptable to changing environments, comprising;

a microphone for picking up a sound regenerated from a loudspeaker;

[processing means] a processor for comparing [at] in real time an output signal from [said] the microphone with an output signal from a sound source with reference to [the] a frequency characteristic [at an optional frequency and the] and an echo characteristic [of the echo or the], or a reverberation characteristic [of the reverberation each], including the delay time[, respectively] for the echo characteristic or the reverberation characteristic, and correcting a signal from [said] the sound source [with] using the difference in output signal between the microphone and the sound source by reference to the frequency characteristic and the echo characteristic or the reverberation characteristic;

an amplifier for amplifying the output of the processor; and

a loudspeaker.

2. A loudspeaker unit adapted to the environment according to Claim 1 wherein said [processing means] processor for correcting the signal from said sound source comprising:

a first A/D converter for performing digital conversion of a sound signal outputted from the sound source;

a memory for storing the converted voice data of samples taken within a fixed time determined as a subject time for the delay of the reverberation and the echo;

a second A/D converter for performing digital conversion of the feedback signal outputted from said microphone as the feedback data;

a successive comparison analysis part for successively comparing said feedback data with the stored voice data, analyzing the intensity of the reverberation and the echo and outputting the result as a correction parameter;

a regenerative signal processing part for adding data corrected by said correction parameter to the stored voice data and processing the result as the regenerative data; and

a D/A converter for converting said regenerative data to an analog signal.

4. A loudspeaker unit adapted to the environment according to Claim 1 wherein,

the frequency comparison of the characteristic [at said optional frequency] and the comparison of the characteristic of the echo or the reverberation each including the delay time are learned by arithmetic and a signal to be sent to the loudspeaker is corrected according to the learned result.

5. A loudspeaker unit adapted to the environment according to Claim 2 wherein,

the frequency comparison of the characteristic [at said optional frequency] and the comparison of the characteristic of the echo or the reverberation each including the delay time are learned by arithmetic and a signal to be sent to the loudspeaker is corrected according to the learned result.

6. A loudspeaker unit adapted to the environment according to Claim 1 wherein,

the frequency comparison of the characteristic [at said optional frequency] and the comparison of the characteristic of the echo or the reverberation each including the delay time are intermittently performed and a signal to be sent to the loudspeaker is corrected according to the comparison result.

7. A loudspeaker unit adapted to the environment according to Claim 2 wherein,

the frequency comparison of the characteristic [at said optional frequency] and the comparison of the characteristic of the echo or the reverberation each including the delay time are intermittently performed and a signal to be sent to the loudspeaker is corrected according to the comparison result.

8. A loudspeaker unit adapted to the environment according to Claim 4 wherein,

the frequency comparison of the characteristic [at said optional frequency] and the comparison of the characteristic of the echo or the reverberation each including the delay time are intermittently performed and a signal to be sent to the loudspeaker is corrected according to the comparison result.

9. A loudspeaker unit adapted to the environment according to Claim 5 wherein,

the frequency comparison of the characteristic [at said optional frequency] and the comparison of the characteristic of the echo or the reverberation each including the delay time are intermittently performed and a signal to be sent to the loudspeaker is corrected according to the comparison result.